What's your E2IQ?

ENERGY LEARN

FACT SHEET

Key Terms

- Generator
- Kinetic Energy
- Penstocks
- Potential Energy
- Turbines
- Water Cycle
- Water Vapor

Hydropower Facts

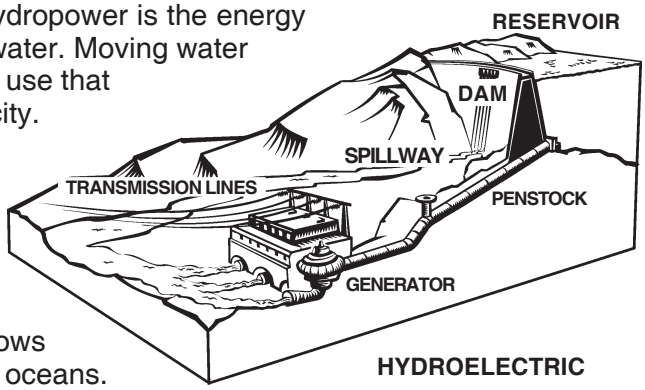
- Worldwide, about 20 percent of all electricity is generated by hydropower.
- Hydropower provides about 10 percent of the electricity in the United States.
- The United States is the second largest producer of hydropower in the world. Canada is first.
- In the United States, hydropower produces enough electricity to serve the needs of 28 million household customers. This is equal to all the homes in Wisconsin, Michigan, Minnesota, Indiana, Iowa, Ohio, Missouri, Nebraska, Kansas, North and South Dakota, Kentucky and Tennessee.

Hydropower

What is Hydropower?

Hydro means water. Hydropower is the energy we make with moving water. Moving water has a lot of energy. We use that energy to make electricity.

Gravity makes the water move. Gravity pulls the water from high ground to low ground. The rain that falls in the mountains flows down the valleys to the oceans.



Hydropower is renewable.

The sun heats the water in the oceans, turning it into *water vapor.* The warm vapor rises into the sky. It turns into clouds when it reaches the cold air above the earth. The clouds release the water as rain or snow. This water flows back to the oceans and rivers and the cycle starts again. This is called the *water cycle.*

The water cycle will keep going forever. The water on earth will always be there. We will not run out of it. That's why it is a renewable energy source.

History of Hydropower

Water has been used as a source of energy for centuries. The Greeks used water wheels to grind wheat into flour more than 2,000 years ago. In the early 1800s, American and European factories used water wheels to power machines. The water wheel is a simple machine. The wheel picks up water in buckets located around the wheel. The weight of the water causes the wheel to turn. Water wheels convert the energy to grind grain, drive sawmills or pump water.

In the late 1800s, the force of falling water was first used to generate electricity. The first hydroelectric plant was built at Niagara Falls in 1879. In the years that followed, many hydropower dams were built.

Continued on back

By the 1940s, the best sites in the United States for large dams had been developed.

At about the same time, fossil fuel power plants began to be popular. These plants could make electricity more cheaply than hydropower plants. It wasn't until the price of oil skyrocketed in the 1970s that people became interested in hydropower again.

Hydropower Dams

It is easier to build a hydro plant on a river where there is a natural waterfall. That's why the first hydro plant was built at Niagara Falls. Dams, which produce artificial waterfalls, are the next best way.

Dams are built on rivers where the terrain of the land will produce a lake or reservoir. Today there are about 80,000 dams in the United States, but only 3 percent have equipment to generate electricity.

Most of the dams in the United States were built to control flooding or irrigate farmland, not for electricity production. We could increase the amount of hydropower produced in this country by putting equipment to generate electricity on many of the existing dams.

Hydropower Plants

Hydropower plants use modern turbine generators to produce electricity just as coal, oil or nuclear power plants do. The difference is the fuel. A typical hydro plant has three parts:

- an electric plant where the electricity is produced;
- a dam with gates that can be opened or closed to control water flow; and
- a reservoir where water can be stored.

A hydro plant uses the force of falling water to produce electricity. A dam opens gates at the top to allow water from the reservoir to flow down a large tube call a *penstock.* At the bottom of the penstock, the fast-moving water – *kinetic energy* – spins the blades of a turbine.

The *turbine* is attached to a *generator* to produce electricity. The electricity is then transported along huge transmission lines to a utility company.

Storing Energy

One of the biggest advantages of hydropower dams is their ability to store energy. After all, the water in a reservoir is stored energy – *potential energy*.

Water can be stored in a reservoir and released when electricity is needed. During the night, when people use less electricity, the gates can be closed and water held in the reservoir. Then, during the day, when people need more electricity, the gates can be opened so that the water can flow through the plant to generate electricity.

Hydropower and the Environment

Hydropower is a clean energy source, but it does change the environment. Damming rivers may disturb or damage the wildlife and natural resources of an area. Farms, roads and sometimes whole towns may have to be moved when a dam is built, because the reservoir that is created could flood many acres of land.

On the positive side, hydropower's fuel supply (flowing water) is clean and replenished by snow and rainfall. In addition, hydro plants do not emit any pollutants because they burn no fuel. The dams also control floodwater and reservoirs provide lakes for boating, swimming and fishing.

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